An Experimental Investigation on Replacement Of Coarse Aggregate By Rubber Tyre In Concrete

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Abstract- *In recent days available of natural resources are scarcely available and disposal of the used materials becomes a great challenge. As a result of industrialization and urbanization the usage of rubber tyre has increased drastically. The disposal of such used rubbers creates lot of environmental issues. So an attempt was made in this replace coarse aggregate by used tyre rubber particles in concrete. This is better advantage of saving in natural aggregate as well as it effectively uses the waste materials. For M30 grade of concrete, replacement was made in 2.5%, 5%, and 7.5%. A comparison is done in between the conventional concrete and rubber mixed concrete. In this research the waste rubber tyre in used instead of coarse aggregate the M30 Grade of concrete was designed on IS 10262:2009. In this paper the coarse is replaced with different proportion like 2.5% , 5% and 7.5%. The mechanical proportions compressive strength, tensile strength and flexural strength rubber tyre for strength. Concrete has been structural the optimum percentage of replacement tyre has been found from the test results. The replacement of coarse aggregate by rubber tyre 20mm in concrete*

Keywords- WasteRubber tyre, Compression, Flexural strength.

I. INTRODUCTION

The rubber product got huge demand in day to life across the world. The rubber which is most commonly used in the automobile. The usage of vehicle increases, so there is huge wastageof rubber tyre in recent days. Due to the increase indisposal of rubber by incinerationand land filling that creates environmental issues, hence the reusage of used tyre rubber is appreciated in the present situation. The usage can be done by converting the used tyre rubber is substituting it as coarse a agggregate in concrete. Disposal of waste rubber tyre is one of the major concerns for all over the world.

RUBBER TYRE

The waste rubber tyre size 20mm sieve retaine.

II. METHODOLOGY

This project follows the steps given below:

- Collection and study the material properties require for making a concrete.
- Mix proportioning of concrete (M_{30}).Investigation of strength parameter like Compressive, Tensile, and Flexural strength of conventional concrete $V_s$special

III. MATERIAL PROPERTIES

Cement Tests

cement is binder, that can sets and hardens independently and is used to bind some other materials together. the volcanic ash and crushed pulverized brick additives are altogether added to burn lime to obtain a hydraulic binder were later called as, and cement. cement which is used in construction is characterized as hydraulic. Cement is obtained by pulversing clinker formed by calcining raw materials primarily comprising of lime (CaO), silica (SiO2), Alumina (Al2O3), and ferric Oxide (Fe2O3) along with some minor oxides the aggregate together to produce a continuous compact mass. concrete mass in a given condition depends on the type, quality, and quantity of cement.

The fine aggregate confirms to Zone III and is designated as fine sand. All tests are carried out as per IS: 383-2000.

Aggregate are obtained by crushing various types of granites, schist, crystalline and lime stone and good quality sand stones.

Mix Proportions

Grade of Concrete	Cement (Kg/m^3)	Fine aggregate(Kg/m^3)	Coarse aggregate (Kg/m^3)	Water (liter)
M_{30}	438	768.2	1000	0.45
	1	1.75	2.28	197

1) EXPERIMENTAL INVESTIGATIONS

Compressive strength

The compressive strength of concrete is one of the most important properties of concrete. Comparative strength if M_{30} grade of concrete for the fully replacement of sand by crushed was found. In this test 150x150x150mm concrete cubes were cast, by using 30 Mpa concrete. The mixing was done by cubes were remolded and placed under water and cured for 28 days. Then the cubes were tested for their crushing strength at 7, 14 and 28 days.

$$\text{Compressive strength} = \frac{ultimate\,load}{cross-sectional\,area\,of\,cube}$$

Split tensile strength

The test is carried out in a cylindrical specimen of 150mm diameter and 300mm height. The cylindrical specimen is placed horizontally between the loading surface of a compression testing machine and the load is applied until failure of cylinder, along the vertical diameter. The split tensile strength is given by the formula,

$$\text{Split tensile strength (Mpa)} = \frac{2P}{\pi LD}$$

Where,

D= diameter of the cylinder = 150mm
L= length of the cylinder = 300mm
P = Compressive load on cylinder

2) Flexural Strength of Concrete Beam

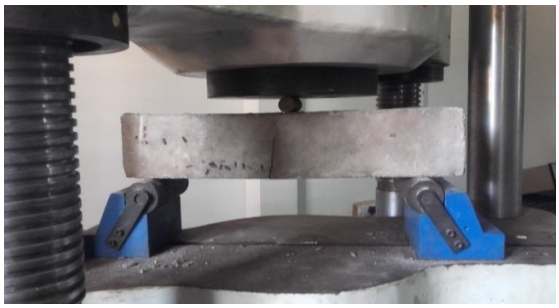
To determine the flexural strength of concrete of beam of size 500 x 100 x 100mm were cast with steel & bamboo reinforcement concrete. After 24hours the specimen were remoulded and subjected to water curing. After 7, 14 and 28days of curing, the curing three beams were taken and allowed to dry and tested in UTM.

Flexural strength of concrete of beam of size 500 x 100 x 100mm were cast with steel & bamboo reinforcement concrete. After 24hours the specimen were remoulded and subjected to water curing. After 3, 7, 14 and 28days of curing, the curing three beams were taken and allowed to dry and tested in UTM.

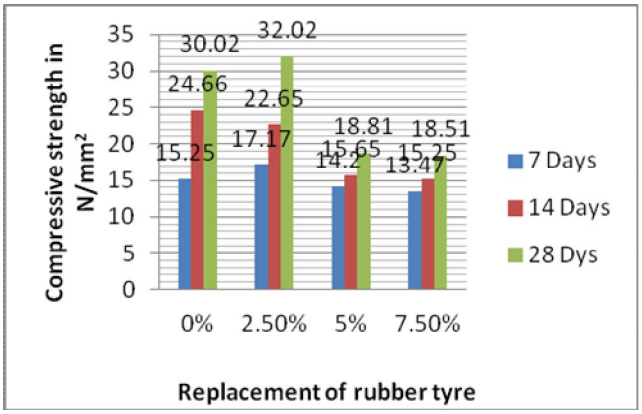
$$\text{Flexural strength(Fct)} = \frac{pl}{bd_2}\ (N/mm^2)$$

Where,

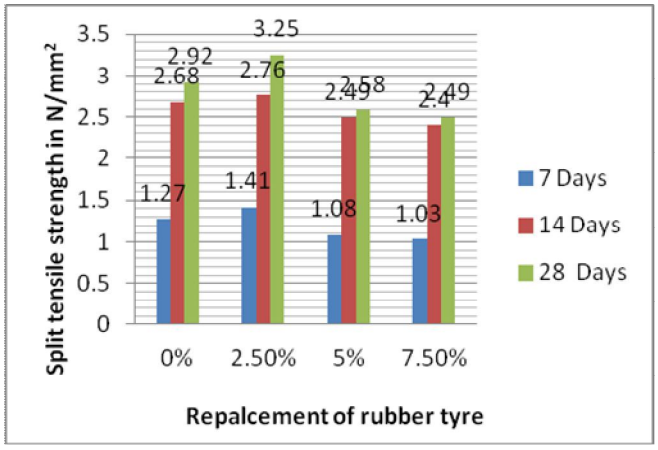
P – Ultimate load (N)
l - Length of specimen (mm)
b – Width of specimen (mm)
d – Depth of specimen (mm)



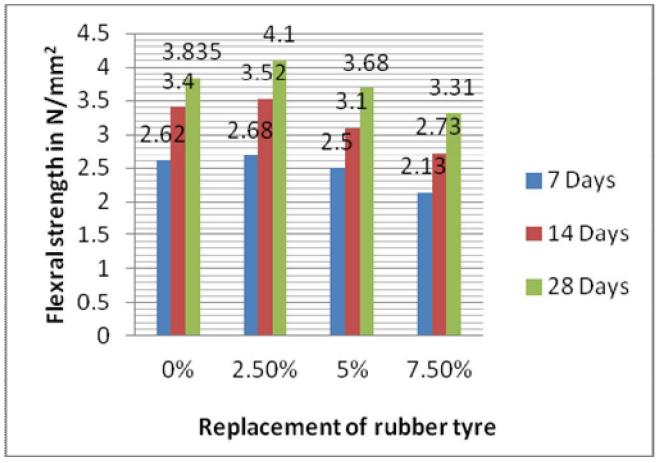
Comparison of compressive strength Result



Comparison of split tensile strength Result



Comparison Flexral Strength



IV. CONCLUSION

- Mix M_{30} can be effectively used in reinforced concrete structure for increased durability and reduced economic.
- The specimen coarse aggregate up to 7.5% and coarse aggregate subjected to compressive strength, split tensile strength and flexural strength, results are tabulated.
- From the results of compressive strength, split tensile strength, flexural strength of 7 days, 14 days and 28 days curing, 2.5% replacement of coarse aggregate to using rubber tyre the strength is increases with compare conventional concrete strength.
- This, when compared to conventional concrete 2.5% replacement of coarse aggregate with rubber tyre the increases in compressive strength, split tensile strength and flexural strength.
- The replacement of rubber tyre for compressive strength, split tensile strength and flexural strength of 7 days, 14 days and 28 days curing, 5%, and 7.5% replacement of coarse aggregate to using rubber tyre decreases concrete strength.

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